US-PAT-NO: 5889856
DOCUMENT-IDENTIFIER: US 5889856 A
TITLE: ADSL integrated line card with digital splitter and POTS CODEC without bulky analog splitter

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Application Filing Date - AD (1):

19970522

Brief Summary Text - BSTX (6):

Integrated Services Digital Network (ISDN) boosted data rates over existing copper phone lines to 128 kbps. Special termination and conditioning of the existing copper phone lines is required for ISDN. ISDN's future is in doubt now that newer analog modems are reaching 56 kbps without expensive conditioning of the phone lines. Digital-Subscriber Lines (DSL) are now becoming available. DSL provides bandwidth up to 8 Mbps downstream, or up to 2 Mbps symmetric. DSL approaches the bandwidth of T1 lines, about 1.5 Mbps. Several variations of DSL technology are being explored, such as HDSL, IDSL, SDSL, RADSL and ADSL. ADSL (asymmetric DSL) is particularly attractive for consumer Internet applications where most of the data traffic is downloaded to the customer. Upstream bandwidth for uploading data can be reduced to increase downstream bandwidth since most Internet traffic is downstream traffic. See U.S. Pat. Nos. 5,461,616, 5,534,912, and 5,410,343 for descriptions of ADSL technology.

Brief Summary Text - BSTX (23):

High-pass filter 88 is a network of capacitors 98 in series and inductors 96 in parallel. Series-capacitor, parallel-inductor networks pass high-frequency signals but block low-frequency components. Thus high-pass filter 88 passes the high-frequency components from incoming telephone line 20 while blocking the low-frequency POTS components. The high-frequency components are passed on to a data highway through an XDSL modem.

Detailed Description Text - DETX (24):

High-pass filter 62 performs a high-pass FIR filter to extract frequency components that are greater than 4 kHz. High-pass filter 62 then passes these high-frequency components to xDSL modem 70, which performs additional signal processing to extract the ADSL data from the customer and format the data for transmission to the Internet over high-speed ADSL data pathway 30. This additional signal processing can include fast-fourier-transforms, Viterbi decoding, de-channelization, forward-error-correction, and cyclical-redundancy checking (CRC). Trellis encoding is a technique used to convert data

bits to phase and amplitude constellation points such that data errors are reduced. Viterbi decoding is used to recover data that has been trellis encoded. The ADSL modem data may be multiplexed into separate logical channels, with different error-correction characteristics. Channelization is the process of merging the streams onto the ADSL data stream and de-channelization is the process of recovering them. The term "xDSL" refers to any DSL technology such as ADSL, IDSL, RADSL, HDSL, SDSL.

Detailed Description Text - DETX (30):

xDSL data from high-speed data pathway 30 is received by xDSL modem 70. The data received is re-formatted and modulated at the high frequency used by xDSL modem 70. CRC generation, forward-error-correction generation, trellis encoding, and inversefast-fourier transforms are performed by xDSL modem 70. The high-frequency modulated output from xDSL modem 70 is sent to digital mixer 80 to be combined with the incoming voice stream before conversion to analog voltages.

Detailed Description Text - DETX (32):

The converted data stream from sample-rate converter 72 is mixed with the data stream from xDSL modem 70. Both data streams are at a 1 MHz sample rate. The digital values for the POTS data stream can be superimposed or added to the digital values for the ADSL data stream by digital mixer 80. Digital mixer 80 outputs the composite data stream with both the high-frequency ADSL data and the low-frequency voice data to the A/D converter for transmission over the local phone line to the customer.

US-PAT-NO: 6226356
DOCUMENT-IDENTIFIER: US 6226356 B1
TITLE: Method and apparatus for power regulation of digital data transmission

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Application Filing Date - AD (1):

19980612

Brief Summary Text - BSTX (8):

There are now at least four popular versions of DSL technology, namely Asymmetrical Digital Subscriber Line (ADSL), Integrated Services Digital Network Digital Subscriber Line (IDSL), Very High-Speed Digital Subscriber Line (VDSL), and Symmetric Digital Subscriber Line (SDSL). Although each technology is generally directed at different types of users, they all share certain characteristics. For example, all four DSL systems utilize the existing, ubiquitous telephone wiring infrastructure, deliver greater bandwidth, and operate by employing special digital signal processing. Because the aforementioned technologies are well known in the art, they will not be described in detail herein.

Brief Summary Text - BSTX (9):

DSL, as well as its later siblings, is making it possible for users to communicate over normal telephone wires at a much faster rate than before. The different flavors of DSL will converge around specific market niches and applications. For example, home users may favor ADSL for uses such as video-on-demand and Internet access. On the other hand, small businesses could find IDSL attractive for telecommuting and high-speed data transmission. Large businesses might choose VDSL to deliver Internet traffic or limited multimedia traffic to large businesses.

Detailed Description Text - DETX (7):

The host and user interfaces 105, 110 in the illustrated embodiment are DSL-technology interfaces, and thus may be ADSL, IDSL, HDSL, or other digital subscriber line interfaces. The host interface 105, which may be located in a central switching office, includes a DSL circuitry 118 and a line driver 120 capable of driving signals onto the subscriber line 115. The user interface 110, which may reside at a customer's residence, is capable of receiving signals transmitted by the line driver 120 of the DSL circuitry 118. The signals transmitted and received by the two interfaces 105, 110 may be analog waveforms of digital symbols.

Detailed Description Text - DETX (16):

In the illustrated embodiment, the communications system 300 supports both a DSL system and Plain Old Telephone Service (POTS). Accordingly, the host interface 305 and the user interface 310 include POTS circuitry 315, 320 and DSL circuitry 118, 330, respectively. The host interface 305 can be a line card, for example, that supports both POTS and DSL technology. The DSL circuitry 118 may be circuitry for ADSL, IDSL, HDSL, or other digital subscriber line technology.

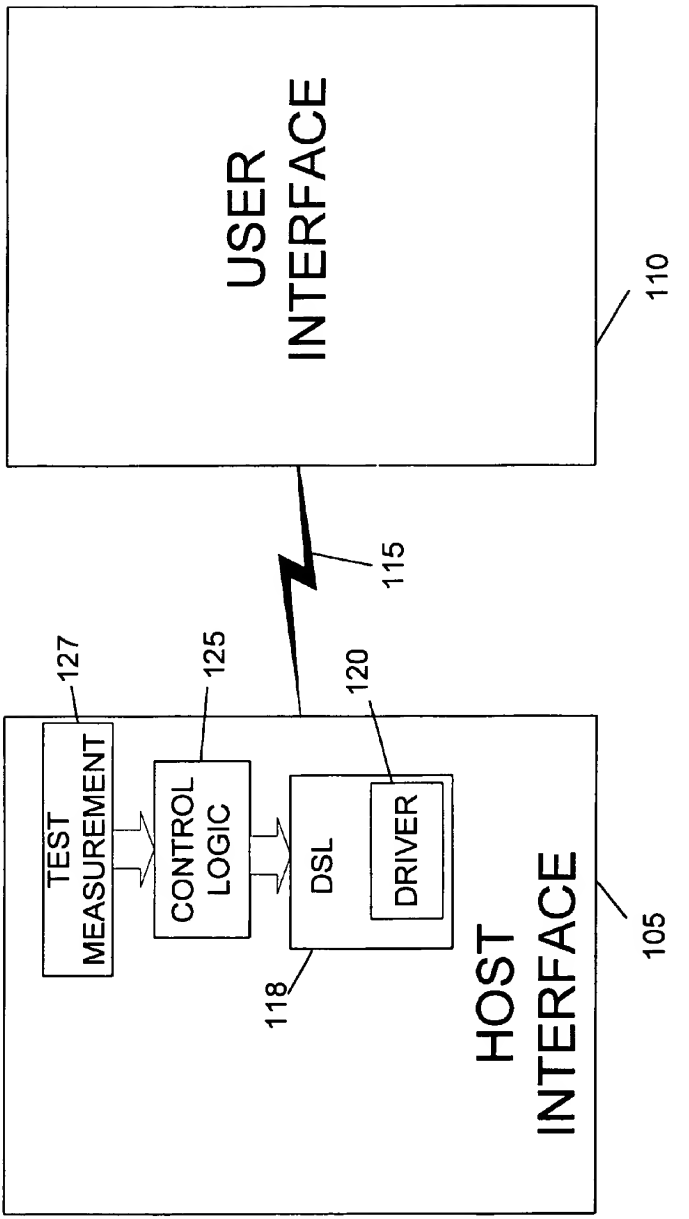
USER INTERFACE
110
115
127
125
120
TEST MEASUREMENT
CONTROL LOGIC
DSL
DRIVER
118
HOST INTERFACE
105
100

FIGURE 1

US-PAT-NO: 6215785
DOCUMENT-IDENTIFIER: US 6215785 B1
TITLE: Method and apparatus for communicating across ADSL lines

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Application Filing Date - AD (1):

19980211

Brief Summary Text - BSTX (10):

Another type of communications link, an integrated DSL (IDSL), is created when ISDN technologies are applied to DSL. An IDSL line is capable of bi-directionally transferring data at rates of up to approximately 128 Kbps, which is typically sufficient for transmitting voice information between touch-tone (TT) phones. A first IDSL line 136 may be used to connect a TT phone associated with an entity, e.g., residence customer 108b, across WAN 104, to a TT phone associated with another entity, e.g., residence customer 108d, which is connected to a second IDSL line 140. When voice data is to be transmitted from residence customer 108b to residence customer 108d, the voice data is transmitted in analog form across IDSL line 136, which is a copper wire, to a node 144 where the voice data is digitized. The digitized voice data is then routed over WAN to another node 146, where the digitized voice data is converted back into analog form, and sent over IDSL line 140 to residence customer 108d.

Brief Summary Text - BSTX (12):

In general, an IDSL connection is considered to be sufficient to transfer voice data between TT phones because the volume of data transfer is relatively low. However, in order to transfer data relating to the Internet, e.g., World Wide Web pages and video-on-demand data, to Internet customers such as residence customers, an ADSL connection is typically preferred over an IDSL connection. Internet usage typically involves downloading information to a computer system, as for example a computer system associated with the residence customer. Hence, since an ADSL connection is arranged to provide the capability to quickly download relatively high volumes of data to a computer system, while still enabling data to be uploaded from the computer system when necessary, an ADSL connection is particularly suitable for use by customers who generally download data.